REMARKS

In the Office Action dated February 22, 2006, claims 1-6 were examined with the result that all claims were rejected. In response, Applicant has rewritten claim 1. In view of the above amendments and following remarks, reconsideration of this application is requested.

In the Office Action, the Examiner first objected to the drawings because Figs. 1-3 were exploded views, and the components in each Figure were not bracketed. In response, Applicant has submitted a substitute sheet showing Figs. 1-3 in brackets. The label "Replacement Sheet" has been inserted in the top margin. Accordingly, Applicant requests the objection to the drawings as not being shown in brackets should be withdrawn by the Examiner.

In the Office Action, the drawings were also objected to because they included the reference numeral "21" originally shown in Fig. 1 which was not mentioned in the specification. In response, Applicant had deleted reference numeral 21 from Fig. 1. Accordingly, Applicant believes the Examiner should withdraw the objection to the drawings based on 37 C.F.R. §1.84.

In the Office Action, claims 1-6 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sons U.S. Patent No. 3,552,658 in view of Sons et al. U.S. Patent No. 4,167, 247. In response, Applicant has the following comments.

Claim 1 has been amended to specify that the incompressible hydraulic fluid is "from the vehicle's hydraulic fluid system." The basis for this amendment is provided on page 2, lines 11-17; and page 4, lines 26-29. Amended claim 1 more clearly distinguishes the invention over the prior art by clarifying that the spray valve is operable when connected to the vehicle's hydraulic fluid system. No prior art document teaches, suggests, or motivates a person of ordinary skill to the solution of a spray valve as defined in amended claim 1 of the present invention.

In response to industry demands, the Applicant has engineered, developed and tested the claimed single acting hydraulic spray head valve. Industry was looking to

utilize existing cab-chassis equipment system configurations (electric and hydraulic) for retro-fitment of a spray valve. In particular, there was a need for retrofitting of a spray valve which did not require additional systems (e.g. pneumatic) and would not require additional technical support and spare parts. This was especially important in the target industries of mining and construction which rely heavily on being supported by access to spare parts that are hard wearing and available at a reasonable cost to minimize the effect that downtime has on overall productivity.

After extensive searching, the Applicant found that despite the long felt demand from industry, there was no available source of any such single acting hydraulic water valve that operated with failsafe success and was an individual one piece item that included a water spraying component.

When presented with the problem of providing a "spray valve which requires few moving parts and can be used on a truck or vehicle without the need of additional equipment" (page 1, lines 19 to 21), the Applicant was required to consider a variety of internal and environmental factors. These included:

- potential contamination to the system;
- containment of fluids within their designated chambers;
- effective mechanical operation of the valve using fluid pressures;
- safety of design due to internal and external operating pressures;
- control measures to guarantee safe operating fluid pressures;
- visual assessment/monitoring of system safety;
- interchangeability between spare parts of existing and newly developed product;
- serviceability and repair assembly of the product in the field;
- longevity of product operation when in industrial application;
- ability to operate in cold weather conditions;
- ability to be able to operate in high humidity conditions; and
- ability to operate in underground applications.

Therefore, a person of ordinary skill when addressing these problems would appreciate that there is a significant array of issues which need to be addressed before a solution is reached.

The Examiner has stated that U.S. Patent No. 3,552,658 to Sons (hereinafter Sons '658) discloses all of the features of the present application except:

1. A hydraulic chamber for receiving an incompressible hydraulic fluid through a piston port (compressed air is used in Sons '658).
2. A resilient diaphragm; and
3. An upper seat for the piston (piston integral with seat valve in Sons '658).

The Examiner has indicated that U.S. Patent No. 4,167, 247 to Sons et al. (hereinafter Sons et al.) discloses features 1 and 2 and that in view of Sons et al., the relevant skilled person would have included these features to create a more reliable spray valve that is less prone to leakage. The Examiner has further stated that feature 3 is a feature which could be derived from the integral system of Sons '658 through routine skill in the art of valve making.

Applicants respectfully disagree with the Examiner's comments. In regard to feature 1, as noted by the Examiner, Sons et al. does disclose "admission of air or another suitable control fluid under pressure" (column 3, lines 57-60). However, there is no express disclosure that another suitable control fluid for use under pressure is compressible hydraulic fluid from the vehicle's hydraulic fluid system. A person of ordinary skill would be aware of the previously mentioned internal and environmental issues which needed to be addressed and hence the "interchangeability" of pneumatic control pressure with hydraulic control fluid pressure from the vehicle's hydraulic fluid system would not be without significant technical risk.

An understanding of hydraulic fluid system movement and hydraulic fluid control is a key element to the present invention's operational success. Hydraulic fluid and calculated available operating surface areas on the piston are required to overcome the available forces of system water pressure to guarantee the spray head valve could be

finitely controlled when operating on and off. Governed hydraulic pressures of a known safe and acceptable operating level are also essential to ensure operating success. Further, operational frictions and machined component tolerances where addressed when engineering the valve for efficiency of controlled on/off operation. The components had to be able to withstand variations in operating system hydraulic temperatures and also resist destruction from operational impact between the piston and related moving parts.

The casting that houses the piston and requires machining to exact tolerances, had to be designed to withstand the calculated hydraulic internal pressures when being operated. The hydraulic system design had to be capable of operating from system hydraulics, with an acceptable oil supply to close the valve, and venting of oil to tank to allow water pressure to open the valve and deliver the water is required. If the proportional efforts of each fluid acting on the determined surface areas at set fluid pressures were not precise, the valve would fail to operate effectively in application at safe operating pressures. The system considerations also addressed the venting of all fluid pressures when the equipment was neutralized. These created a fail-safe system of complete safety to all personnel working on the system during routine maintenance.

Sons et al states that:

> "In the *preferred embodiment air is utilized as a control pressure medium, and the control pressure source is an air compressor of the kind well-known in the art, connected by wires and a switch to a convenient source of electric power"* (column 5, line 64 to column 6, line 3).

Sons et al. teaches that the control pressure (pneumatic) is controlled by a dedicated air compressor. As described above, there are numerous difficulties involved in enabling a hydraulic fluid control pressure system to operate from a vehicle's hydraulic system. Thus, a person of ordinary skill would not be motivated to interchange an air pressure control system from a dedicated air supply to that of control pressure based upon a truck's hydraulic system (let along to a spray valve including a piston integrally

connected to the valve seat as defined in the present invention.)

In regard to feature 2, the Examiner has stated that it would have been obvious to a person of ordinary skill to include a resilient diaphragm, such as that taught by Sons et al. and integrally connected to the piston of Sons '658. However, the problem identified in the present invention relates to providing a spray valve which requires fewer moving parts. When a person of ordinary skill is faced with this problem, it would be counter-intuitive to combine a resilient diaphragm and a piston together to achieve a basic function which either can perform separately. Indeed, the problem relates to the reduction in moving parts, not a duplication of features. Indeed, the person of ordinary skill is not directed to combine the resilient diaphragm of Sons et al. with the features of Sons '658. Sons et al. does not teach, suggest, or motivate the person of ordinary skill to use a diaphragm of resilient material to minimize valve malfunction resulting from a dusty or sandy environment. Sons et al. merely states that the diaphragm valve is used as it can be easily replaced (column 2, lines 49-50). The fact that the only featured attribute of the diaphragm valve is that it can be easily replaced teaches away from its use to more reliably prevent leakage of control fluid from the control chamber, as suggested by the Examiner. Even if the person of ordinary skill was motivated to use a diaphragm of resilient material, there is no teaching or suggestion in either prior art document that the diaphragm should be combined with a piston such as in the present invention. If anything the person of ordinary skill would be motivated to replace the piston with the diaphragm rather than combine the two.

In regard to feature 3, the Examiner has stated that an integrally formed piston and seat valve would have been obvious to a person of ordinary skill. While the inventive step of feature 3 may not be considered substantial, inventive step or obviousness is to be determined upon the difference in the present invention from the disclosures in the prior art. For the person of ordinary skill to arrive at the present invention, when presented with Sons '658 in view of Sons et al., they must have been taught, suggested or motivated to adopt each and ever one of the three distinguishing

features to arrive at the solution of the present invention. Applicants submit that the prior art does not provide such direction.

The presentation of a combination of prior art documents which, with the benefit of hindsight, may be used to reverse engineer the solution of the present invention is not sufficient to establish obviousness of the invention. The Applicants contest that in the past forty years, no single inventor has successfully adapted any product which permits successful control of a spray valve via a single acting hydraulic control, even though there has been a market demand for such a product. The present invention has been successful in capturing an increasing market share in both the US and Australian within specialized market segments. In particular, the invention has proven to be advantageous in conditions where air compressors do not operate effectively. For example, the Applicant's pumps of the present invention are in particular demand in:

- high humidity environments (including cold mornings) where air compressors do not work effectively, unless supplied with an additional air drier to remove moisture from the air;
- underground applications (e.g., mining) where the closed hydraulic system is more practical or economically justifiable; and
- vehicles which are not dedicated to spraying fluid and the addition of an air compressor is not practical or economically justifiable; and
- low temperature environments where water removed when air is compressed has a tendency to freeze in supply lines and within equipment unless adequately purged.

The closed hydraulic system of the present invention has been proven to be more cost effective; safer; easier to operate; and more reliable with the closed hydraulic system being robust to the external environmental. The increasing uptake of the Applicant's pumps, through replacement of existing air compressor based pumps, illustrates that the present invention is satisfying a long felt need. The fact that no other pumps within the scope of the present invention have entered the market, despite this market demand, is

testament to the non-obviousness of the invention.

An effort has been made to place this application in a condition for allowance and such action is earnestly requested.

Respectfully submitted,

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In the Drawings:

Please replace original Figs. 1-3 as filed with the enclosed Figs. 1-3 as amended.